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Letter to the Editor

The accuracy of "Preliminary estimation of the novel coronavirus disease (COVID-19) cases in Iran: A modelling analysis based on overseas cases and air travel data"

We read a recent study by Zhuang et al. entitled "Preliminary estimation of the novel coronavirus disease (COVID-19) cases in Iran: A modeling analysis based on overseas cases and air travel data" published in *International Journal of Infectious Diseases* (Zhuang et al., 2020) with interest. The paper estimated 16533 (95% CI: 5925, 35538) COVID-19 cases in Iran by 25 February. As a group of epidemiologists, who engage in the control of the epidemic in Iran, we have some comments about the accuracy of the results and the methodology of the work.

First, the flight passengers are not a random sample for the whole country. We think those with international flights have a more extensive network, and this will increase the probability of getting infected with an emerging disease that is not endemic inside the country. Besides, more than 25% of Iran's population live in the rural area, and it seems the prevalence of infection among them is highly lower than in large cities (Statistical center of Iran, 2020).

Second, it is not clear the source of the infection whether they infected inside of Iran or they were international travelers from other countries. Some passengers, especially Chinese, prefer to use Iran as the connection for their international flights. The spread of the disease from China has been attributed to the level of its communication with other countries. Iran has communication with China in the form of trade and travel, however, the level of transfer between the two countries as well as the number of Iranians and Chinese living in the other country does not seem to be more than those observed in other countries of the region and the world (Mounesan et al., 2020).

Third, the mean incubation period for COVID-19 was 5.2 days (4.1–7 days), and the basic reproductive number (R_0) was reported 2.2 (95% CI: 1.4 to 3.9) (Li et al., 2020). In another study, the mean incubation period was ranges from 0-24 days with mean of 6.4 days and it is not easy to approve all or some of the five detected cases were infected inside Iran or they were Iranian (Lipsitch et al., 2020).

Fourth, the estimated number of infected people is dependent on some valid assumptions: the date of the epidemic onset, precise method, basic reproductive number and robust assumptions (Wu et al., 2020). The authors did not clearly define these assumptions. The reason for using each of the parameters is not explained. There are no suitable references for the method used in the study. For example, they used the ABC news for their claims (abcNEWS, 2020).

Fifth, the authors only selected three countries (United Arab Emirates, Lebanon, and Oman), in which the reported cases were defined. So, it is likely that the probability of positive instances of COVID-19 will be highly biased. It is necessary for the authors to consider all international flights from Iran during the mentioned period. Therefore, the estimated probability of positive cases of Iran could overestimate the number of infected cases.

In brief, we think the method used in this modeling is not robust, and the estimated number could overestimate the number of infections in Iran by 25 February. We should use modeling studies for a better view of the epidemic, especially when direct observation is not as practical as the iceberg pattern of the infection. But if we do not use them with a critical eye for their limitations and some subjective assumption, the results could be misleading the response.

There are some concerns about the burden of the COVID-19 epidemic in Iran. By April 6, 2020, 58,266 confirmed cases were detected in Iran with the highest burden of the infection in the East Mediterranean countries. Rapid reporting of cases of COVID-19 in Iran may be attributed to transparency in the reporting, strength of Iran's health system, the importance of discovering high-risk hotspots, and the role of chance that can affect the rate of transmission and cause the faster discovery of the epidemic in a specific region (Mounesan et al., 2020) and all of them not considering in modeling by Zhuang et al.

Conflict of Interest

The authors have no conflict of interest.

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